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(54) ELECTRICALLY-CONDUCTIVE POLYESTER MONOFILAMENT AND INDUSTRIAL WOVEN FABRIC

(57)Abstract:
PURPOSE: To obtain electrically-conductive polyester monofilament or electrically- conductive sheath-core type conjugate polyester monofilament, comprising an electrically-conductive copolyester or the polyester arranged as a sheath part, having both electrical conductivity and fiber properties suitable as an industrial fiber material.
CONSTITUTION: An electrically-conductive copolyester obtained by adding 4-15-wt.% highly electrically-conductive carbon black to 96-85-wt.% of a copolyester comprising 90-98wt.% of a butylene terephthalate unit and/or a butylene isophthalate unit and 10-2wt.% of an aliphatic dicarboxylic acid dibutyl ester unit is subjected to melt spinning to form an electrically-conductive polyester monofilament. Or the electrically-conductive copolyester is used as a sheath composition and an aromatic polyester as a core component. Both the copolyester and the polyester are subjected to conjugate spinning in the weight ratio of the core to the sheath of 50:50 to 95:5 to give electrically-conductive sheath-core type conjugate polyester monofilament. The electrically-conductive monofilament is used as weft and/or warp and woven to form industrial woven fabric.

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CLAIMS

[Claim(s)]
[Claim 1] The conductive polyester monofilament which consists of 96 - 85 % of the weight [of copolymerized polyester which consists of copolymerization components which serve as 4 - 15 % of the weight of high conductivity carbon black from a butylene terephthalate unit and/or 90 - 98 % of the weight of butylene isophthalate units, and 10 - 2 % of the weight of dibutyl ester units of an aliphatic dicarboxylic acid] mixture.
[Claim 2] The sheath-core compound-die conductivity polyester monofilament which a heart component becomes from an aromatic polyester and 96 - 85 % of the weight [of copolymerized polyester by which a sheath component is constituted from a copolymerization component which serves as 4 - 15 % of the weight of high conductivity carbon black from a butylene terephthalate unit and/or 90 - 98 % of the weight of butylene isophthalate units, and 10 - 2 % of the weight of dibutyl ester units of an aliphatic dicarboxylic acid] mixture.
[Claim 3] The sheath-core compound-die conductivity polyester monofilament according to claim 2 characterized by the compound ratios of a sheath-core being 50:50-95:5 by the weight ratio of a heart component and a sheath component.
[Claim 4] Industrial use textiles characterized by the thing of the woof and/or warp for which a conductive polyester monofilament according to claim 1 to 3 or a sheath-core compound-die conductivity polyester monofilament is used in part at least.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to industrial use textiles excellent in the monofilament which consists of conductive polyester, and antistatic nature.
[0002]
[Description of the Prior Art] Generally, the thermoplastic polyester, for example, a polyethylene terephthalate, has the outstanding dynamics property and the outstanding chemistry property, and it has been widely used as casts, such as fiber and a film. However, since conductivity of polyester was very low, it originated in static electricity tending to be charged, and had various problems. For example, when the polyester monofilament was used for industrial use textiles which dry moisture and the organic solvent at the time of sanitary product manufacture of fine-particles sieving filters, such as wheat flour, a disposable diaper, a physiology product, etc., such as a dryer belt and dryer canvas of a paper machine, static electricity generated while in use was accumulated on textiles, danger, such as adhesion for the product of dust, and ignition, explosion by the discharge spark, was caused, and it had the fault which causes trouble to operation.
[0003] Various improvement has been tried in order to cope with this problem conventionally. For example, although the industrial use textiles which carried out the union of the metal wires, such as copper wire, to some polyester monofilament textiles are known, since rust is generated in a metal wire or this has the problem of scraping the roller with which textiles contact while in use, it is not practical.
[0004] Moreover, although the industrial use textiles which carried out the union of the conductive sheath-core monofilament which used for the sheath the conductive Nylon which blended conductive carbon black to high concentration to polyester monofilament textiles have also been used, since the dimensional stability at the time of moisture absorption of a polyester monofilament and a nylon monofilament differs in this case. Since the fluidity of the Nylon which blended carbon black to high concentration at the time of manufacture of about [that a wave occurs on textiles during use within a dryer etc.] and a conductive nylon monofilament was bad, it had problems -- uniform sheath-core compound thread is not obtained. Moreover, various meanses to give conductivity to a polyester fiber have also been proposed. For example, the conductive bicomponent fiber which the heart becomes from mixture with an aromatic polyester / aliphatic polyester (mixed weight ratio 80 / 20 - 98/2) mixture polymer, and conductive carbon black, and a sheath becomes from an aromatic polyester is proposed (JP,56-85423,A). however, the time of being compound spinning since the monofilament obtained by this method has inadequate conductivity since conductive carbon black does not exist in a sheath component, and it is necessary to also mix carbon black with 20 - 30 % of the weight so much substantially -- a spinneret -- a hole -- generating of circumference dirt took place and it had the problem that the production stabilized for a long time was difficult
[0005]
[Problem(s) to be Solved by the Invention] Then, the purpose of this invention cancels the above-mentioned various faults, and is in the conductive polyester monofilament which has a suitable performance for industrial use textiles, such as a dryer belt which dries moisture and the organic solvent at the time of sanitary product manufacture of fine-particles sieving filters, such as wheat flour, a disposable diaper, a physiology product, etc., and dryer canvas of a paper machine, etc., and the various industrial use textiles using this monofilament.
[0006]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, the conductive polyester monofilament of this invention is characterized by the bird clapper from 96 - 85 % of the weight of copolymerized polyester which consists of copolymerization components which serve as 4 - 15 % of the weight of high conductivity carbon black from a butylene terephthalate unit and/or 90 - 98 % of the weight of butylene isophthalate units, and 10 - 2 % of the weight of dibutyl ester units of an aliphatic dicarboxylic acid.
[0007] Moreover, the sheath-core compound-die conductivity polyester monofilament of this invention is characterized by the bird clapper from 96 - 85 % of the weight of copolymerized polyester by which a heart component is constituted from a copolymerization component to which an aromatic polyester and a sheath component serve as 4 - 15 % of the weight of high conductivity carbon black from a butylene terephthalate unit and/or 90 - 98 % of the weight of butylene isophthalate units, and 10 - 2 % of the weight of dibutyl ester units of an aliphatic dicarboxylic acid.
[0008] Furthermore, the industrial use textiles of this invention are characterized by using the above-mentioned conductive polyester monofilament at least in part or conductive sheath-core compound polyester monofilament of the woof and/or warp.

[0009] Hereafter, this invention is explained in detail. The copolymerized polyester which is the constituent of a monofilament of this invention is copolymerized polyester which consists of copolymerization components which consist of a butylene terephthalate unit and/or 90 - 98 % of the weight of butylene isophthalate units, and 10 - 2 % of the weight of dibutyl ester units of an aliphatic dicarboxylic acid. It is not desirable in order to cause the spinning bad condition resulting from the shortage of a fluidity, if there are few copolymerization ratios of the dibutyl ester unit of the aliphatic dicarboxylic acid in this copolymerized polyester than the above-mentioned range. Moreover, if there are more copolymerization ratios of the dibutyl ester unit of the aliphatic dicarboxylic acid in copolymerized polyester than the above-mentioned range, since dirt adheres into melt spinning around spinneret ****** or the wire-size spots of a monofilament increase, it is not desirable. The limiting viscosity [eta] of copolymerized polyester should just usually use 0.3 or more things. The dibutyl ester unit of the dicarboxylic acid of 3-10 methylene numbers is desirable, and the dibutyl ester unit of the aliphatic dicarboxylic acid in copolymerized polyester has a still more desirable dibutyl horse mackerel peat unit also in these.
[0010] Although what consists of 2 functionality components and glycol components, such as an aromatic dicarboxylic acid or its dialkyl ester, is made into a subject, as for the aromatic polyester of the heart component in the sheath-core compound-die conductivity polyester monofilament of this invention, what makes especially a polyethylene terephthalate (henceforth PET) a subject is desirable. The polyester which makes this PET a subject may be KOPORI ester even if it is gay polyester. as a copolymerization component For example, an adipic acid, a sebacic acid, a phthalic acid, naphthalene -2, 6-dicarboxylic acid, Dicarboxylic-acid components, such as 5-sodium sulfoisophtharate, trimellitic acid, Hydroxy-acid components, such as multiple-valued carboxylic-acid components, such as pyromellitic acid, and p-oxyethoxy benzoic acid, And a tetramethylene glycol, a hexamethylene glycol, a diethylene glycol, Diol components, such as a propylene glycol, neopentyl glycol, polyoxy alkylene glycol, p-KISHIRIREN glycol, 1, 4-cyclohexane dimethanol, and 5-sodium sulfo resorcinol, may be included. Moreover, according to the purpose, you may add inorganic particles, such as titanium oxide, a silica, and an alumina.
[0011] Although it should just usually be 0.6 or more, when using the conductive polyester monofilament of this invention for paper-making dryer canvas etc., as for the limiting viscosity of the above-mentioned aromatic polyester, it is advantageous to use 0.68 or more things from the field of endurance. Limiting viscosity is the limiting viscosity for which it asked from the viscosity measured at 25 degrees C among the phenol / tetrachloroethane (1/1) solution here, and it is expressed with [eta].
[0012] As for the high conductivity carbon black contained in the polyester monofilament of this invention, the amount of DBP oil supply (the 9g method) says furnace system carbon black (340ml / 100g or more). As such carbon black, the KETCHIEN black international company make "KETCHIEN black" (trademark) EC and "KETCHIEN black" (trademark) EC600JD are known. As compared with the "KETCHIEN black" (trademark) etc. EC which the amount of DBP oil supply described above as carbon black although acetylene black (300ml / 100g or less) was also known, conductivity is low, in order to acquire the conductivity are satisfied [with acetylene black] of conductivity, for example, the "black" (trademark) EC about 3 times the addition of KETCHIEN is needed, and since the fluidity of polyester falls, it cannot be used.
[0013] 4 - 15 % of the weight is required for the sheath component of the sheath-core compound-die conductivity polyester monofilament of this invention, and the amount of the above-mentioned quantity conductivity carbon black in a conductive polyester monofilament. Its 7 - 15 % of the weight is desirable, and the content in the sheath component in the case of using the "KETCHIEN black" (trademark) EC as carbon black has 4 - 8 desirable % of the weight, when using "KETCHIEN black" (trademark) EC600JD as carbon black. If there are more amounts of carbon black than the above-mentioned range, the fluidity of a resin falls, wire-size dispersion (henceforth wire-size spots) of the monofilament obtained will become large, or melt spinning will become difficult. Moreover, if there are few amounts of carbon black than the above-mentioned range, the conductivity of the monofilament obtained will become inadequate. The mixture with high conductivity carbon black and copolymerized polyester can be obtained by kneading under heating by the well-known method, for example, a biaxial kneading extruder, the dough mixer, etc.
[0014] The monofilament as used in the field of this invention may be a continuous fiber which consists of one single yarn, and things of what configuration, such as what has cross-section configurations, such as a round head, a triangle, a rectangular head, and a regular polygon, are sufficient as it. Moreover, although the diameter of a cross section can be suitably chosen by the use, the range of 0.05-3mm is most often used. Moreover, although the required intensity of thread changes with uses, it is desirable that it is 3.0g/denier or more in general.
[0015] Manufacture of the conductive polyester monofilament of this invention and a conductive sheath-core compound polyester monofilament does not need a special method at all, but can be performed by the well-known spinning method.
[0016] The sheath-core compound ratio of the conductive sheath-core compound polyester monofilament of this invention requires that heart component:sheath components should be 50:50-99:5 by the weight ratio. If the ratio of a sheath component increases more than a heart component, although conductivity will improve, the intensity of a monofilament falls. On the other hand, if the ratio of a sheath component becomes less than the above-mentioned range, since conductivity will become inadequate, neither is desirable.
[0017] It has sufficient conductivity, thread physical properties also come out enough, and, for a certain reason, the conductive polyester monofilament of this invention and sheath-core compound-die conductivity polyester monofilament which are obtained in this way are useful as an antistatic wire rod of various kinds of industrial use textiles.
[0018] In addition, if the outer layer of these monofilaments is covered with resins, such as polyester which does not contain conductive carbon black further, a polyamide, a polyolefine, an epoxy resin, and fluororesin, when presenting the sieving filter use of edible fine particles, such as wheat flour, and rice powder, various starch, with the conductive polyester

monofilament of this invention, and a sheath-core compound-die conductivity polyester monofilament (henceforth surface coating), since the black omission object of the conductive polyester generated rarely can prevent mixing in edible fine particles, it is desirable. As the surface coating method in this case, the well-known 3-fold sheath-core compound spinning method, coating, etc. are employable.

[0019] The industrial use textiles of this invention are the various industrial use textiles which carried out weaving using the above-mentioned conductive polyester monofilament at least in part or sheath-core compound-die conductivity polyester monofilament of the woof which constitutes textiles, and/or warp. the weave of these industrial use textiles -- a use -- suitably -- it can choose -- for example, a plain weave, twill, and a duplex -- textile -- three-fold well-known weaves, such as textile, are employable Moreover, the industrial use textiles of this invention can be suitably used as industrial use textiles, such as a dryer belt which it can be used [belt] for various uses since the obstacle by electrification in use can be prevented, for example, dries moisture and the organic solvent at the time of sanitary product manufacture of fine-particles sieving filters, such as wheat flour, a disposable diaper, a physiology product, etc., and dryer canvas of a paper machine, etc.

[0020]

[Example] An example is given to below and this invention is explained to it still in detail. In addition, measurement of the band voltage at the time of a run of the textiles in an example uses Rion 03 [electrostatic-field measurement opportunity EA-], hangs endless textiles on two rollers, and measures the band voltage at the time of making it run for 2 minutes the speed for 360m/from 10cm distance.

[0021] Moreover, the wire-size spots in an example measure a wire size for 300m of monofilament samples the speed for 30m/using the ANRITSU CORP. make and laser outer-diameter measuring instrument KL-151A, and search for the difference of the maximum of measured value, and the minimum value.

[0022] [Example 1] The copolymerized polyester (0.50) 90 weight section which consists of 65.3 % of the weight of butylene terephthalate units dried at 150 degrees C under the vacuum for 8 hours, 30.1 % of the weight of butylene isophthalate units, and 4.6 % of the weight of butylene horse mackerel peat units, and the "KETCHIEN black" EC(KETCHIEN black international incorporated company product (henceforth KB-EC)) 10 weight section. After kneading for about 4 minutes at 285 degrees C using biaxial kneading and an extruder, it extruded in the shape of a gut, and after cooling, cutting was performed and the carbon black content polyester chip was obtained.

[0023] subsequently, the extruder formula melt spinning machine which dries the obtained carbon black content polyester chip at 150 degrees C for 8 hours, and has a spinning head at the nose of cam of an extruder -- using it -- a law -- melt spinning was performed by the method and phi0.3mm and the conductive polyester monofilament of a circular cross section were obtained The conductivity (specific resistance) of this monofilament and the evaluation result of wire-size spots are shown in Table 1.

[0024] [Examples 2-5 and comparison examples 1-2] The result made to be the same as that of an example 1 is written together to Table 1 as examples 2-5 and comparison examples 1-2 except having changed the amount of the copolymerized polyester in an example 1, and KB-EC, as shown in the 1st table.

[0025] [An example 6 and comparison example 3] It is "KETCHIEN black" EC600JD (KETCHIEN black international incorporated company product.) about KB-EC in an example 1. Except having changed into (it is hereafter called KB-ECJ), the result of the monofilament obtained like the example 1 is made into an example 6, and it writes together to Table 1 by making into the comparison example 3 the result of the monofilament obtained like the example 1 except similarly having changed KB-EC in an example 1 into acetylene black (henceforth AB).

[0026]

[Table 1]

No.	カーボンブラック		共重合ポリエステル				比抵抗	線径斑
	種類*1	添加量 (wt%)	量 (wt%)	共重合組成 (wt%)*2 b-1	b-2	b-3	(Ω・cm)	(μm)
比較実施例1	KB-EC	3	97	65.3	30.1	4.6	4.8×10^{5}	3
実施例2	KB-EC	4	96	65.3	30.1	4.6	5.1×10^{3}	4
実施例3	KB-EC	8	92	65.3	30.1	4.6	6.9×10^{2}	4
実施例1	KB-EC	10	90	65.3	30.1	4.6	3.5×10^{2}	4
実施例4	KB-EC	12	88	65.3	30.1	4.6	2.2×10^{2}	5
実施例5	KB-EC	15	85	65.3	30.1	4.6	1.9×10^{2}	7
実施例6	KB-ECJ	6	94	65.3	30.1	4.6	3.8×10^{2}	5
比較実施例2	KB-EC	18	82	65.3	30.1	4.6	(溶融紡糸不可能)	
比較実施例3	AB	10	90	65.3	30.1	4.6	7.4×10^{9}	4

*1 KB-EC : "ケッチェンブラック" EC

KB-ECJ : "ケッチェンブラック" EC600JD

AB : アセチレンブラック

2 b-1 : ブチレンテレフタレート単位

b-2 : ブチレンイソフタレート単位

b-3 : ブチレンアジペート単位

[Examples 7-8 and comparison examples 4-5] The result (spinneret a hole specific resistance, a circumference dirt situation, a melt spinning situation) performed like the example 1 is shown in Table 2 except having changed composition of the copolymerized polyester in an example 1 into Table 2 as the publication. In addition, the result of an example 1 is written together in Table 2.

[0027]

[Table 2]

No.	カーボンブラック		共重合ポリエステル				比抵抗	紡糸口金孔の周辺汚れ (紡糸1時間後)	溶融紡糸状況
	種類1	添加量 (wt%)	量 (wt%)	共重合組成(wt%)*2 b-1	b-2	b-3	(Ω・cm)		
比較実施例4	KB-EC	10	90	67.8	31.2	1.0	-	-	吐出斑多く紡糸不可能
実施例7	KB-EC	10	90	67.1	30.9	2.0	3.6×10^{2}	なし	24時間安定紡糸
実施例1	KB-EC	10	90	65.3	30.1	4.6	3.5×10^{2}	なし	24時間安定紡糸
実施例8	KB-EC	10	90	61.6	28.4	10.0	3.6×10^{2}	なし	24時間安定紡糸
比較実施例5	KB-EC	10	90	58.2	26.8	15.0	3.6×10^{2}	多い	2時間後汚れひどく紡糸中止

*1 KB-EC : "ケッチェンブラック" EC

2 b-1 : ブチレンテレフタレート単位

b-2 : ブチレンイソフタレート単位

b-3 : ブチレンアジペート単位

[Example 9] The PET chip of the limiting viscosity 0.94 (it measures at 25 degrees C among the partially aromatic solvent of a phenol and tetrachloroethane 1:1) dried at 160 degrees C under the vacuum for 8 hours was prepared as a heart component. On the other hand, it is a sheath component. After kneading the copolymerized polyester (0.50) 90 weight section and the KB-EC10 weight section which consist of 65.3 % of the weight of butylene terephthalate units dried at 150 degrees C under the vacuum for 8 hours, 30.1 % of the weight of butylene isophthalate units, and 4.6 % of the weight of butylene horse mackerel peat units for about 4 minutes at 285 degrees C using biaxial kneading and an extruder, it extruded in the shape of a gut, and after cooling, after performing cutting, it dried at 150 degrees C for 8 hours, and the carbon black content copolymerized polyester chip was prepared.

[0028] the compound spinning machine which has two sets of extruders for the above-mentioned carbon black content copolymerized polyester chip for sheath components, and the PET chip for heart components -- using it -- a law -- sheath-core compound spinning was performed by the method, and phi0.3mm, the heart / sheath compound weight ratios 70/30, and the conductive polyester monofilament of a circular cross section were obtained The conductivity (specific resistance) of the

obtained monofilament and the evaluation result of wire-size spots are shown in Table 3.

[0029] [Examples 10-13 and comparison examples 6-7] The result made to be the same as that of an example 9 is written together to Table 3 except having changed as given [the copolymerized polyester of a sheath component and the amount of KB-EC in an example 9] in Table 6.

[0030] [An example 14 and comparison example 8] It is "KETCHIEN black" EC600JD (KETCHIEN black international incorporated company product.) about KB-EC in an example 9. Except having changed into (it is hereafter called KB-ECJ), the result of the monofilament obtained like the example 9 is made into an example 14, and it writes together to Table 3 by making into the comparison example 8 the result of the monofilament obtained like the example 9 except similarly having changed KB-EC in an example 9 into acetylene black (henceforth AB).

[0031]

[Table 3]

No.	芯成分PET 複合重量比	鞘成分 複合重量比	カーボンブラック 種類*1	カーボンブラック 添加量 (wt%)	共重合ポリエステル 量 (wt%)	共重合組成(wt%)*2 b-1	b-2	b-3	比抵抗 (Ω・cm)	線径斑 (μm)
比較実施例6	70	30	KB-EC	3	97	65.3	30.1	4.6	2.9×10^{6}	3
実施例10	70	30	KB-EC	4	96	65.3	30.1	4.6	5.2×10^{4}	4
実施例11	70	30	KB-EC	8	92	65.3	30.1	4.6	4.9×10^{3}	4
実施例9	70	30	KB-EC	10	90	65.3	30.1	4.6	2.3×10^{3}	4
実施例12	70	30	KB-EC	12	88	65.3	30.1	4.6	1.6×10^{3}	4
実施例13	70	30	KB-EC	15	85	65.3	30.1	4.6	8.9×10^{2}	5
実施例14	70	30	KB-ECJ	6	94	65.3	30.1	4.6	3.0×10^{3}	10
比較実施例7	70	30	KB-EC	18	82	65.3	30.1	4.6	(開成分の多い部分があり紡糸不可能)	
比較実施例8	70	30	AB	10	90	65.3	30.1	4.6	8.7×10^{9}	4

*1 KB-EC : "ケッチェンブラック" EC

KB-ECJ : "ケッチェンブラック" EC600JD

AB : アセチレンブラック

*2 b-1 : ブチレンテレフタレート単位

b-2 : ブチレンイソフタレート単位

b-3 : ブチレンアジペート単位

[Examples 15-16 and comparison examples 9-10] The result (spinneret a hole specific resistance, a circumference dirt situation, a melt spinning situation) performed like the example 9 is shown in Table 4 except having changed composition of the copolymerized polyester in an example 9 into Table 4 as the publication. In addition, the result of an example 9 is written together in Table 4.

[0032]

[Table 4]

No.	芯成分 PET 複合重量比	鞘成分 複合重量比	カーボンブラック 種類*1	カーボンブラック 添加量 (wt%)	共重合ポリエステル 量 (wt%)	共重合組成 (wt%)*2 b-1	b-2	b-3	比抵抗 (Ω・cm)	紡糸口金孔の周辺汚れ (紡糸1時間後)	溶融紡糸状況
比較実施例9	70	30	KB-EC	10	90	67.8	31.2	1.0	-	-	吐出斑多く紡糸不可能
実施例15	70	30	KB-EC	10	90	67.1	30.9	2.0	2.7×10^{3}	なし	24時間安定紡糸
実施例9	70	30	KB-EC	10	90	65.3	30.1	4.6	2.3×10^{3}	なし	24時間安定紡糸
実施例16	70	30	KB-EC	10	90	61.6	28.4	10.0	2.4×10^{3}	なし	24時間安定紡糸
比較実施例10	70	30	KB-EC	10	90	58.2	26.8	15.0	2.2×10^{3}	多い	1.5時間、指のびく紡糸性

*1 KB-EC : "ケッチェンブラック" EC

*2 b-1 : ブチレンテレフタレート単位, b-2 : ブチレンイソフタレート単位, b-3 : ブチレンアジペート単位

[Examples 17-18 and comparison examples 11-12] The result performed like the example 9 is shown in Table 5 except having changed the sheath-core compound ratio in an example 9 into Table 5 as the publication. In addition, the result of an

example 9 is written together in Table 5.

[0033]

[Table 5]

No.	芯成分PET複合重量比	鞘成分							比抵抗 (Ω・cm)	強度 (g/d)
		複合重量比	カーボンブラック		共重合ポリエステル					
			種類*1	添加量 (wt%)	量 (wt%)	共重合組成(wt%)*2				
						b-1	b-2	b-3		
比較実施例11	30	70	KB-EC	10	90	65.3	30.1	4.6	2.2×10^{2}	2.9
実施例17	50	50	KB-EC	10	90	65.3	30.1	4.6	5.8×10^{2}	3.7
実施例9	70	30	KB-EC	10	90	65.3	30.1	4.6	2.3×10^{3}	3.9
実施例18	95	5	KB-EC	10	90	65.3	30.1	4.6	8.5×10^{3}	4.2
比較実施例12	98	2	KB-EC	10	90	65.3	30.1	4.6	6.4×10^{7}	4.5

*1 KB-EC : "ケッチェンブラック" EC

2 b-1：ブチレンテレフタレート単位, b-2：ブチレンイソフタレート単位, b-3：ブチレンアジペート単位.

[Examples 19-22 and comparison example 13] The plain weave fabric of 5cm width of face which used for warp the phi0.3mm circular cross-section monofilament which consists of a PET independent, and used for the woof the conductive monofilament obtained in the example 1 was created. The result measured by the method which described above the band voltage at the time of a run of these textiles is shown in Table 6 (example 19). Moreover, the result of the textiles which performed like the example 19 and were obtained is written together to Table 6 except having changed the woof in an example 1 into the sheath-core compound-die conductivity monofilament obtained in the example 9 (example 20). Moreover, the result of the textiles which performed like the example 1 and were obtained is written together to Table 6 except having used for both warp and the woof the conductive monofilament obtained in the example 1 (example 21). Moreover, the result of the textiles which performed like the example 1 and were obtained is written together to Table 6 except having used for both warp and the woof the sheath-core compound-die conductivity monofilament obtained in the example 9 (example 22). For comparison, the plain weave fabric of 5cm width of face using the phi0.5mm circular cross-section monofilament which the woof and warp become from a PET independent is created, and the result which measured the band voltage at the time of a run similarly is written together to Table 6 (comparison example 13).

[0034]

[Table 6]

No.	織物の構成		耐電圧 (V)
	経糸	緯糸	
実施例19	PET単独糸	実施例1で得た導電性モノフィラメント	-560
実施例20	PET単独糸	実施例9で得た導電性芯鞘複合モノフィラメント	-670
実施例21	実施例1で得た導電性モノフィラメント	実施例1で得た導電性モノフィラメント	-250
実施例22	実施例9で得た導電性芯鞘複合モノフィラメント	実施例9で得た導電性芯鞘複合モノフィラメント	-380
比較実施例13	PET単独糸	PET単独糸	-25000

[0035]

[Effect of the Invention] As explained above, since the conductive polyester monofilament of this invention and the sheath-core compound-die conductivity polyester monofilament have sufficient conductivity and thread physical properties, they are useful as an antistatic wire rod of various kinds of industrial use textiles. moreover, the industrial use textiles using the conductive sheath-core compound polyester monofilament of this invention can be suitably used as various industrial use textiles used for the process which is [canvas / dryer / the dryer belt which the outstanding antistatic effect is had and accumulated / belt /, for example, dries moisture and the organic solvent at the time of sanitary product manufacture of fine-particles sieving filters, such as wheat flour, a disposable diaper, a physiology product, etc., / of a paper machine] easy to be charged

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[Translation done.]

* NOTICES *

1. This document has been translated by computer.So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] this invention relates to industrial use textiles excellent in the monofilament which consists of conductive polyester, and antistatic nature.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Generally, the thermoplastic polyester, for example, a polyethylene terephthalate, has the outstanding dynamics property and the outstanding chemistry property, and it has been widely used as casts, such as fiber and a film. However, since conductivity of polyester was very low, it originated in static electricity tending to be charged, and had various problems. For example, when the polyester monofilament was used for industrial use textiles which dry moisture and the organic solvent at the time of sanitary product manufacture of fine-particles sieving filters, such as wheat flour, a disposable diaper, a physiology product, etc., such as a dryer belt and dryer canvas of a paper machine, static electricity generated while in use was accumulated on textiles, danger, such as adhesion for the product of dust, and ignition, explosion by the discharge spark, was caused, and it had the fault which causes trouble to operation.

[0003] Various improvement has been tried in order to cope with this problem conventionally. For example, although the industrial use textiles which carried out the union of the metal wires, such as copper wire, to some polyester monofilament textiles are known, since rust is generated in a metal wire or this has the problem of scraping the roller with which textiles contact while in use, it is not practical.

[0004] Moreover, although the industrial use textiles which carried out the union of the conductive sheath-core monofilament which used for the sheath the conductive Nylon which blended conductive carbon black to high concentration to polyester monofilament textiles have also been used, since the dimensional stability at the time of moisture absorption of a polyester monofilament and a nylon monofilament differs in this case. Since the fluidity of the Nylon which blended carbon black to high concentration at the time of manufacture of about [that a wave occurs on textiles during use within a dryer etc.] and a conductive nylon monofilament was bad, it had problems -- uniform sheath-core compound thread is not obtained. Moreover, various meanses to give conductivity to a polyester fiber have also been proposed. For example, the conductive bicomponent fiber which the heart becomes from mixture with an aromatic polyester / aliphatic polyester (mixed weight ratio 80 / 20 - 98/2) mixture polymer, and conductive carbon black, and a sheath becomes from an aromatic polyester is proposed (JP,56-85423,A). however, the time of being compound spinning since the monofilament obtained by this method has inadequate conductivity since conductive carbon black does not exist in a sheath component, and it is necessary to also mix carbon black with 20 - 30 % of the weight so much substantially -- a spinneret -- a hole -- generating of circumference dirt took place and it had the problem that the production stabilized for a long time was difficult

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[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, since the conductive polyester monofilament of this invention and the sheath-core compound-die conductivity polyester monofilament have sufficient conductivity and thread physical properties, they are useful as an antistatic wire rod of various kinds of industrial use textiles. moreover, the industrial use textiles using the conductive sheath-core compound polyester monofilament of this invention can be suitably used as various industrial use textiles used for the process which is [canvas / dryer / the dryer belt which the outstanding antistatic effect is had and accumulated / belt /, for example, dries moisture and the organic solvent at the time of sanitary product manufacture of fine-particles sieving filters, such as wheat flour, a disposable diaper, a physiology product, etc., / of a paper machine] easy to be charged

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Then, the purpose of this invention cancels the above-mentioned various faults, and is in the conductive polyester monofilament which has a suitable performance for industrial use textiles, such as a dryer belt which dries moisture and the organic solvent at the time of sanitary product manufacture of fine-particles sieving filters, such as wheat flour, a disposable diaper, a physiology product, etc., and dryer canvas of a paper machine, etc., and the various industrial use textiles using this monofilament.

[Translation done.]

MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the conductive polyester monofilament of this invention is characterized by the bird clapper from 96 - 85 % of the weight of copolymerized polyester which consists of copolymerization components which serve as 4 - 15 % of the weight of high conductivity carbon black from a butylene terephthalate unit and/or 90 - 98 % of the weight of butylene isophthalate units, and 10 - 2 % of the weight of dibutyl ester units of an aliphatic dicarboxylic acid.

[0007] Moreover, the sheath-core compound-die conductivity polyester monofilament of this invention is characterized by the bird clapper from 96 - 85 % of the weight of copolymerized polyester by which a heart component is constituted from a copolymerization component to which an aromatic polyester and a sheath component serve as 4 - 15 % of the weight of high conductivity carbon black from a butylene terephthalate unit and/or 90 - 98 % of the weight of butylene isophthalate units, and 10 - 2 % of the weight of dibutyl ester units of an aliphatic dicarboxylic acid.

[0008] Furthermore, the industrial use textiles of this invention are characterized by using the above-mentioned conductive polyester monofilament at least in part or conductive sheath-core compound polyester monofilament of the woof and/or warp.

[0009] Hereafter, this invention is explained in detail. The copolymerized polyester which is the constituent of a monofilament of this invention is copolymerized polyester which consists of copolymerization components which consist of a butylene terephthalate unit and/or 90 - 98 % of the weight of butylene isophthalate units, and 10 - 2 % of the weight of dibutyl ester units of an aliphatic dicarboxylic acid. It is not desirable in order to cause the spinning bad condition resulting from the shortage of a fluidity, if there are few copolymerization ratios of the dibutyl ester unit of the aliphatic dicarboxylic acid in this copolymerized polyester than the above-mentioned range. Moreover, if there are more copolymerization ratios of the dibutyl ester unit of the aliphatic dicarboxylic acid in copolymerized polyester than the above-mentioned range, since dirt adheres into melt spinning around spinneret ****** or the wire-size spots of a monofilament increase, it is not desirable. The limiting viscosity [eta] of copolymerized polyester should just usually use 0.3 or more things. The dibutyl ester unit of the dicarboxylic acid of 3-10 methylene numbers is desirable, and the dibutyl ester unit of the aliphatic dicarboxylic acid in copolymerized polyester has a still more desirable dibutyl horse mackerel peat unit also in these.

[0010] Although what consists of 2 functionality components and glycol components, such as an aromatic dicarboxylic acid or its dialkyl ester, is made into a subject, as for the aromatic polyester of the heart component in the sheath-core compound-die conductivity polyester monofilament of this invention, what makes especially a polyethylene terephthalate (henceforth PET) a subject is desirable. The polyester which makes this PET a subject may be KOPORI ester even if it is gay polyester. as a copolymerization component For example, an adipic acid, a sebacic acid, a phthalic acid, naphthalene -2, 6-dicarboxylic acid, Dicarboxylic-acid components, such as 5-sodium sulfoisophtharate, trimellitic acid, Hydroxy-acid components, such as multiple-valued carboxylic-acid components, such as pyromellitic acid, and p-oxyethoxy benzoic acid, And a tetramethylene glycol, a hexamethylene glycol, a diethylene glycol, Diol components, such as a propylene glycol, neopentyl glycol, polyoxy alkylene glycol, p-KISHIRIREN glycol, 1, 4-cyclohexane dimethanol, and 5-sodium sulfo resorcinol, may be included. Moreover, according to the purpose, you may add inorganic particles, such as titanium oxide, a silica, and an alumina.

[0011] Although it should just usually be 0.6 or more, when using the conductive polyester monofilament of this invention for paper-making dryer canvas etc., as for the limiting viscosity of the above-mentioned aromatic polyester, it is advantageous to use 0.68 or more things from the field of endurance. Limiting viscosity is the limiting viscosity for which it asked from the viscosity measured at 25 degrees C among the phenol / tetrachloroethane (1/1) solution here, and it is expressed with [eta].

[0012] As for the high conductivity carbon black contained in the polyester monofilament of this invention, the amount of DBP oil supply (the 9g method) says furnace system carbon black (340ml / 100g or more). As such carbon black, the KETCHIEN black international company make "KETCHIEN black" (trademark) EC and "KETCHIEN black" (trademark) EC600JD are known. As compared with the "KETCHIEN black" (trademark) etc. EC which the amount of DBP oil supply described above as carbon black although acetylene black (300ml / 100g or less) was also known, conductivity is low, in order to acquire the conductivity are satisfied [with acetylene black] of conductivity, for example, the "black" (trademark) EC about 3 times the addition of KETCHIEN is needed, and since the fluidity of polyester falls, it cannot be used.

[0013] 4 - 15 % of the weight is required for the sheath component of the sheath-core compound-die conductivity polyester monofilament of this invention, and the amount of the above-mentioned quantity conductivity carbon black in a conductive polyester monofilament. Its 7 - 15 % of the weight is desirable, and the content in the sheath component in the case of using the "KETCHIEN black" (trademark) EC as carbon black has 4 - 8 desirable % of the weight, when using "KETCHIEN black"

(trademark) EC600JD as carbon black. If there are more amounts of carbon black than the above-mentioned range, the fluidity of a resin falls, wire-size dispersion (henceforth wire-size spots) of the monofilament obtained will become large, or melt spinning will become difficult. Moreover, if there are few amounts of carbon black than the above-mentioned range, the conductivity of the monofilament obtained will become inadequate. The mixture with high conductivity carbon black and copolymerized polyester can be obtained by kneading under heating by the well-known method, for example, a biaxial kneading extruder, the dough mixer, etc.

[0014] The monofilament as used in the field of this invention may be a continuous fiber which consists of one single yarn, and things of what configuration, such as what has cross-section configurations, such as a round head, a triangle, a rectangular head, and a regular polygon, are sufficient as it. Moreover, although the diameter of a cross section can be suitably chosen by the use, the range of 0.05-3mm is most often used. Moreover, although the required intensity of thread changes with uses, it is desirable that it is 3.0g/denier or more in general.

[0015] Manufacture of the conductive polyester monofilament of this invention and a conductive sheath-core compound polyester monofilament does not need a special method at all, but can be performed by the well-known spinning method.

[0016] The sheath-core compound ratio of the conductive sheath-core compound polyester monofilament of this invention requires that heart component:sheath components should be 50:50-99:5 by the weight ratio. If the ratio of a sheath component increases more than a heart component, although conductivity will improve, the intensity of a monofilament falls. On the other hand, if the ratio of a sheath component becomes less than the above-mentioned range, since conductivity will become inadequate, neither is desirable.

[0017] It has sufficient conductivity, thread physical properties also come out enough, and, for a certain reason, the conductive polyester monofilament of this invention and sheath-core compound-die conductivity polyester monofilament which are obtained in this way are useful as an antistatic wire rod of various kinds of industrial use textiles.

[0018] In addition, if the outer layer of these monofilaments is covered with resins, such as polyester which does not contain conductive carbon black further, a polyamide, a polyolefine, an epoxy resin, and fluororesin, when presenting the sieving filter use of edible fine particles, such as wheat flour, and rice powder, various starch, with the conductive polyester monofilament of this invention, and a sheath-core compound-die conductivity polyester monofilament (henceforth surface coating), since the black omission object of the conductive polyester generated rarely can prevent mixing in edible fine particles, it is desirable. As the surface coating method in this case, the well-known 3-fold sheath-core compound spinning method, coating, etc. are employable.

[0019] The industrial use textiles of this invention are the various industrial use textiles which carried out weaving using the above-mentioned conductive polyester monofilament at least in part or sheath-core compound-die conductivity polyester monofilament of the woof which constitutes textiles, and/or warp. the weave of these industrial use textiles -- a use -- suitably -- it can choose -- for example, a plain weave, twill, and a duplex -- textile -- three-fold well-known weaves, such as textile, are employable Moreover, the industrial use textiles of this invention can be suitably used as industrial use textiles, such as a dryer belt which it can be used [belt] for various uses since the obstacle by electrification in use can be prevented, for example, dries moisture and the organic solvent at the time of sanitary product manufacture of fine-particles sieving filters, such as wheat flour, a disposable diaper, a physiology product, etc., and dryer canvas of a paper machine, etc.

[Translation done.]

EXAMPLE

[Example] An example is given to below and this invention is explained to it still in detail. In addition, measurement of the band voltage at the time of a run of the textiles in an example uses Rion 03 [electrostatic-field measurement opportunity EA-], hangs endless textiles on two rollers, and measures the band voltage at the time of making it run for 2 minutes the speed for 360m/from 10cm distance.

[0021] Moreover, the wire-size spots in an example measure a wire size for 300m of monofilament samples the speed for 30m/using the ANRITSU CORP. make and laser outer-diameter measuring instrument KL-151A, and search for the difference of the maximum of measured value, and the minimum value.

[0022] [Example 1] The copolymerized polyester (0.50) 90 weight section which consists of 65.3 % of the weight of butylene terephthalate units dried at 150 degrees C under the vacuum for 8 hours, 30.1 % of the weight of butylene isophthalate units, and 4.6 % of the weight of butylene horse mackerel peat units, and the "KETCHIEN black" EC(KETCHIEN black international incorporated company product (henceforth KB-EC)) 10 weight section. After kneading for about 4 minutes at 285 degrees C using biaxial kneading and an extruder, it extruded in the shape of a gut, and after cooling, cutting was performed and the carbon black content polyester chip was obtained.

[0023] subsequently, the extruder formula melt spinning machine which dries the obtained carbon black content polyester chip at 150 degrees C for 8 hours, and has a spinning head at the nose of cam of an extruder -- using it -- a law -- melt spinning was performed by the method and phi0.3mm and the conductive polyester monofilament of a circular cross section were obtained The conductivity (specific resistance) of this monofilament and the evaluation result of wire-size spots are shown in Table 1.

[0024] [Examples 2-5 and comparison examples 1-2] The result made to be the same as that of an example 1 is written together to Table 1 as examples 2-5 and comparison examples 1-2 except having changed the amount of the copolymerized polyester in an example 1, and KB-EC, as shown in the 1st table.

[0025] [An example 6 and comparison example 3] It is "KETCHIEN black" EC600JD (KETCHIEN black international incorporated company product.) about KB-EC in an example 1. Except having changed into (it is hereafter called KB-ECJ), the result of the monofilament obtained like the example 1 is made into an example 6, and it writes together to Table 1 by making into the comparison example 3 the result of the monofilament obtained like the example 1 except similarly having changed KB-EC in an example 1 into acetylene black (henceforth AB).

[0026]

[Table 1]

No.	カーボンブラック		共重合ポリエステル				比抵抗	繊径斑
	種 類*1	添加量 (wt%)	量 (wt%)	共重合組成 (wt%)*2 b-1	b-2	b-3	(Ω・cm)	(μm)
比較実施例1	KB-EC	3	97	65.3	30.1	4.6	4.8×10^{5}	3
実施例2	KB-EC	4	96	65.3	30.1	4.6	5.1×10^{3}	4
実施例3	KB-EC	8	92	65.3	30.1	4.6	6.9×10^{2}	4
実施例1	KB-EC	10	90	65.3	30.1	4.6	3.5×10^{2}	4
実施例4	KB-EC	12	88	65.3	30.1	4.6	2.2×10^{2}	5
実施例5	KB-EC	15	85	65.3	30.1	4.6	1.9×10^{2}	7
実施例6	KB-ECJ	6	94	65.3	30.1	4.6	3.8×10^{2}	5
比較実施例2	KB-EC	18	82	65.3	30.1	4.6	(溶融紡糸不可能)	
比較実施例3	AB	10	90	65.3	30.1	4.6	7.4×10^{9}	4

*1 KB-EC : "ケッチェンブラック" EC

KB-ECJ : "ケッチェンブラック" EC600JD

AB : アセチレンブラック

*2 b-1 : ブチレンテレフタレート単位

b-2 : ブチレンイソフタレート単位

b-3 : ブチレンアジペート単位

[Examples 7-8 and comparison examples 4-5] The result (spinneret a hole specific resistance, a circumference dirt situation, a melt spinning situation) performed like the example 1 is shown in Table 2 except having changed composition of the copolymerized polyester in an example 1 into Table 2 as the publication. In addition, the result of an example 1 is written together in Table 2.

[0027]

[Table 2]

No.	カーボンブラック		共重合ポリエステル				比抵抗	紡糸口金孔の周辺汚れ	溶融紡糸状況
	種 類*1	添加量 (wt%)	量 (wt%)	共重合組成(wt%)*2 b-1	b-2	b-3	(Ω・cm)	(紡糸1時間後)	
比較実施例4	KB-EC	10	90	67.8	31.2	1.0	-	-	吐出斑多く紡糸不可能
実施例7	KB-EC	10	90	67.1	30.9	2.0	3.6×10^{2}	なし	24時間安定紡糸
実施例1	KB-EC	10	90	65.3	30.1	4.6	3.5×10^{2}	なし	24時間安定紡糸
実施例8	KB-EC	10	90	61.6	28.4	10.0	3.6×10^{2}	なし	24時間安定紡糸
比較実施例5	KB-EC	10	90	58.2	26.8	15.0	3.6×10^{2}	多い	2時間後汚れひどく紡糸中止

*1 KB-EC : "ケッチェンブラック" EC

*2 b-1 : ブチレンテレフタレート単位

b-2 : ブチレンイソフタレート単位

b-3 : ブチレンアジペート単位

[Example 9] The PET chip of the limiting viscosity 0.94 (it measures at 25 degrees C among the partially aromatic solvent of a phenol and tetrachloroethane 1:1) dried at 160 degrees C under the vacuum for 8 hours was prepared as a heart component. On the other hand, it is a sheath component. After kneading the copolymerized polyester (0.50) 90 weight section and the KB-EC10 weight section which consist of 65.3 % of the weight of butylene terephthalate units dried at 150 degrees C under the vacuum for 8 hours, 30.1 % of the weight of butylene isophthalate units, and 4.6 % of the weight of butylene horse mackerel peat units for about 4 minutes at 285 degrees C using biaxial kneading and an extruder, it extruded in the shape of a gut, and after cooling, after performing cutting, it dried at 150 degrees C for 8 hours, and the carbon black content copolymerized polyester chip was prepared.

[0028] the compound spinning machine which has two sets of extruders for the above-mentioned carbon black content copolymerized polyester chip for sheath components, and the PET chip for heart components -- using it -- a law -- sheath-core compound spinning was performed by the method, and phi0.3mm, the heart / sheath compound weight ratios 70/30, and the conductive polyester monofilament of a circular cross section were obtained The conductivity (specific resistance) of the

obtained monofilament and the evaluation result of wire-size spots are shown in Table 3.
[0029] [Examples 10-13 and comparison examples 6-7] The result made to be the same as that of an example 9 is written together to Table 3 except having changed as given [the copolymerized polyester of a sheath component and the amount of KB-EC in an example 9] in Table 6.
[0030] [An example 14 and comparison example 8] It is "KETCHIEN black" EC600JD (KETCHIEN black international incorporated company product.) about KB-EC in an example 9. Except having changed into (it is hereafter called KB-ECJ), the result of the monofilament obtained like the example 9 is made into an example 14, and it writes together to Table 3 by making into the comparison example 8 the result of the monofilament obtained like the example 9 except similarly having changed KB-EC in an example 9 into acetylene black (henceforth AB).
[0031]
[Table 3]

No.	芯成分PET 複合重量比	鞘成分 複合重量比	カーボンブラック 種類*1	添加量 (wt%)	共重合ポリエステル 量 (wt%)	共重合組成(wt%)*2 b-1	b-2	b-3	比抵抗 (Ω・cm)	線径斑 (μm)
比較実施例6	70	30	KB-EC	3	97	65.3	30.1	4.6	2.9×10^{6}	3
実施例10	70	30	KB-EC	4	96	65.3	30.1	4.6	5.2×10^{4}	4
実施例11	70	30	KB-EC	8	92	65.3	30.1	4.6	4.9×10^{3}	4
実施例9	70	30	KB-EC	10	90	65.3	30.1	4.6	2.3×10^{3}	4
実施例12	70	30	KB-EC	12	88	65.3	30.1	4.6	1.6×10^{3}	4
実施例13	70	30	KB-EC	15	85	65.3	30.1	4.6	8.9×10^{2}	5
実施例14	70	30	KB-ECJ	6	94	65.3	30.1	4.6	3.0×10^{3}	10
比較実施例7	70	30	KB-EC	18	82	65.3	30.1	4.6	(組成分の多い部分があり紡糸不可能)	
比較実施例8	70	30	AB	10	90	65.3	30.1	4.6	8.7×10^{9}	4

*1 KB-EC : "ケッチェンブラック" EC
KB-ECJ : "ケッチェンブラック" EC600JD
AB : アセチレンブラック
*2 b-1 : ブチレンテレフタレート単位
b-2 : ブチレンイソフタレート単位
b-3 : ブチレンアジペート単位

[Examples 15-16 and comparison examples 9-10] The result (spinneret a hole specific resistance, a circumference dirt situation, a melt spinning situation) performed like the example 9 is shown in Table 4 except having changed composition of the copolymerized polyester in an example 9 into Table 4 as the publication. In addition, the result of an example 9 is written together in Table 4.
[0032]
[Table 4]

No.	芯成分 PET 複合重量比	鞘成分 複合重量比	カーボンブラック 種類*1	添加量 (wt%)	共重合ポリエステル 量 (wt%)	共重合組成 (wt%)*2 b-1	b-2	b-3	比抵抗 (Ω・cm)	紡糸口金孔の周辺汚れ (紡糸1時間後)	溶融紡糸状況
比較実施例9	70	30	KB-EC	10	90	67.8	31.2	1.0	-	-	吐出斑多く紡糸不可能
実施例15	70	30	KB-EC	10	90	67.1	30.9	2.0	2.7×10^{3}	なし	24時間安定紡糸
実施例9	70	30	KB-EC	10	90	65.3	30.1	4.6	2.3×10^{3}	なし	24時間安定紡糸
実施例16	70	30	KB-EC	10	90	61.6	28.4	10.0	2.4×10^{3}	なし	24時間安定紡糸
比較実施例10	70	30	KB-EC	10	90	58.2	26.8	15.0	2.2×10^{3}	多い	1.5時間、粘りと(糸切れ

1 KB-EC : "ケッチェンブラック" EC
*2 b-1 : ブチレンテレフタレート単位, b-2 : ブチレンイソフタレート単位, b-3 : ブチレンアジペート単位

[Examples 17-18 and comparison examples 11-12] The result performed like the example 9 is shown in Table 5 except having changed the sheath-core compound ratio in an example 9 into Table 5 as the publication. In addition, the result of an

example 9 is written together in Table 5.

[0033]

[Table 5]

No.	芯成分PET複合重量比	鞘成分							比抵抗 (Ω・cm)	強度 (g/d)
		複合重量比	カーボンブラック		共重合ポリエステル					
			種類*1	添加量 (wt%)	量 (wt%)	共重合組成(wt%)*2				
						b-1	b-2	b-3		
比較実施例11	30	70	KB-EC	10	90	65.3	30.1	4.6	2.2×10^{2}	2.9
実施例17	50	50	KB-EC	10	90	65.3	30.1	4.6	5.8×10^{2}	3.7
実施例9	70	30	KB-EC	10	90	65.3	30.1	4.6	2.3×10^{3}	3.9
実施例18	95	5	KB-EC	10	90	65.3	30.1	4.6	8.5×10^{8}	4.2
比較実施例12	98	2	KB-EC	10	90	65.3	30.1	4.6	6.4×10^{7}	4.5

*1 KB-EC : "ケッチェンブラック" EC

*2 b-1：ブチレンテレフタレート単位, b-2：ブチレンイソフタレート単位, b-3：ブチレンアジペート単位.

[Examples 19-22 and comparison example 13] The plain weave fabric of 5cm width of face which used for warp the phi0.3mm circular cross-section monofilament which consists of a PET independent, and used for the woof the conductive monofilament obtained in the example 1 was created. The result measured by the method which described above the band voltage at the time of a run of these textiles is shown in Table 6 (example 19). Moreover, the result of the textiles which performed like the example 19 and were obtained is written together to Table 6 except having changed the woof in an example 1 into the sheath-core compound-die conductivity monofilament obtained in the example 9 (example 20). Moreover, the result of the textiles which performed like the example 1 and were obtained is written together to Table 6 except having used for both warp and the woof the conductive monofilament obtained in the example 1 (example 21). Moreover, the result of the textiles which performed like the example 1 and were obtained is written together to Table 6 except having used for both warp and the woof the sheath-core compound-die conductivity monofilament obtained in the example 9 (example 22). For comparison, the plain weave fabric of 5cm width of face using the phi0.5mm circular cross-section monofilament which the woof and warp become from a PET independent is created, and the result which measured the band voltage at the time of a run similarly is written together to Table 6 (comparison example 13).

[0034]

[Table 6]

No.	織物の構成		耐電圧 (V)
	経糸	緯糸	
実施例19	PET単独糸	実施例1で得た導電性モノフィラメント	-560
実施例20	PET単独糸	実施例9で得た導電性芯鞘複合モノフィラメント	-670
実施例21	実施例1で得た導電性モノフィラメント	実施例1で得た導電性モノフィラメント	-250
実施例22	実施例9で得た導電性芯鞘複合モノフィラメント	実施例9で得た導電性芯鞘複合モノフィラメント	-380
比較実施例13	PET単独糸	PET単独糸	-25000

[Translation done.]